

PATENT COOPERATION TREATY **CORRECTED****PCT****VERSION****INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference RS/sk-15807	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA416)	
International application No. PCT/CH 02/00545	International filing date (day/month/year) 01.10.2002	Priority date (day/month/year) 01.10.2002
International Patent Classification (IPC) or both national classification and IPC H01F27/32		
Applicant DELTA ENERGY SYSTEMS (SWITZERLAND) AG et al.		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 6 sheets, including this cover sheet.
  - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 5 sheets.

## 3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  29.04.2004	Date of completion of this report  23.03.2005
Name and mailing address of the International preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Reder, M  Telephone No. +49 89 2399-7762  

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**international application No. **PCT/CH 02/00545****I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-8, 11, 12

as originally filed

9, 10

received on 13.01.2005 with letter of 13.01.2005

**Claims, Numbers**

2-15

received on 13.12.2004 with letter of 10.12.2004

1

received on 13.01.2005 with letter of 13.01.2005

**Drawings, Sheets**

1/3-3/3

as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
- (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
- ☐ the entire international application.
  - ☒ claims Nos. 12-15
- because:
- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):
  - ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
  - ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
  - ☒ no international search report has been established for the said claims Nos. 12-15
2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:
- ☐ the written form has not been furnished or does not comply with the Standard.
  - ☐ the computer readable form has not been furnished or does not comply with the Standard.

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees, the applicant has:
- ☐ restricted the claims.
  - ☐ paid additional fees.
  - ☐ paid additional fees under protest.
  - ☐ neither restricted nor paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.

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4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

☐ all parts.☒ the parts relating to claims Nos. 1-11 .

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-11
	No: Claims	
Inventive step (IS)	Yes: Claims	1-11
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

2. Citations and explanations

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CH 02/00545

**Re Item IV****Lack of unity of invention**

Several inventions have been found in this international application, as follows:

**1. Claims 1-11:**

Coil form with hollow coil body made of plastic for insertion of a core with an outer coil body surface for holding at least one coil and at least one separating plate made of metal

**2. Claims 12-15:**

Coil form with hollow coil body for insertion of a core with an outer coil body surface for holding at least one coil and the coil body including at least two elements with means to fit the elements together

The two inventions have the following common features:

- coil form with hollow coil body for insertion of a core,
- outer coil body surface for holding at least one coil.

These features are no special technical features because coil forms with these features are already commonly known (see, for example, US-A-3851287, JP-A-6181132 or JP-A-10074634).

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

**1. Reference is made to the following documents:**

- D1: WO 01/78090 A
- D2: US-A-4 652 846
- D3: US-A-3 851 287
- D4: JP 06 181132 A

**2. Novelty**

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2.1 The document D1 which is regarded as the closest prior art discloses a coil form for forming an inductive element with a core and at least two coils (D1: 51, 52), including:

- a) a hollow coil body (D1: 20, 40) for insertion of the core (D1: 70), the coil body having an outer surface,
- b) at least one separating plate (D1: 90) which surrounds the outer surface of the coil body thereby providing at least one coil areas on the surface of the coil body, characterised in that
- c) the coil body is made of plastic (D1: p. 2, l. 39-40) and includes at least one recess on its outer surface for positioning and holding the at least one separating plate,
- d) the separating plate is made of metal, having an opening for pushing the separating plate over the coil body and having a slit (D1: ) for prohibiting leakage currents within the separating plate (D1: 90 in fig. 4 and p. 5, l. 16-21).

Similar coil forms for forming an inductive element are also disclosed in documents D2, D3 and D4.

2.2 The subject-matter of claim 1 therefore differs from this known coil form in that the separating plate forms a winding of one of the at least two coils and at the same time forms a side support for a wire coil to be wound around the coil form.

2.3 As a consequence, the subject-matter of present claim 1 is new.

2.4 The problem to be solved by the present invention may be regarded as: providing a modification of a coil form as known from D1 to D4 which allows to design a more compact transformer.

2.5 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reason:

All of D1 to D4 use the separating plates as shields. In none of D1 to D4 there is any hint for the shields being usable as transformer coils. The use of such a shield or an arrangement of several shields is not considered as being obvious from D1 to D4.

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connected to one of the side walls 6.3, 6.4. On the outer surface of the side walls 6.3, 6.4 recesses 8 are provided for positioning separating plates 3 after fitting them over the coil portion 6.

5 On the lower side of the flange portion 7, terminals 9 are located. Due to the perspective view of fig. 1, some of the terminals 9 are not visible.

10 In fig. 2, an exploded perspective view of a transformer body 10 with the coil form 1 is shown. Fig. 3 shows the same transformer body 10 assembled. Unlike in fig. 1, three separating plates 3 are provided. The transformer body 10 includes a magnetic core 11 which consists of two E-shaped core parts 11.1, 11.2 which include two outer legs 12 and a middle leg 13 respectively. The recesses 14 on the outer legs 12 are provided for mounting clamps (not shown) to hold and press the E-shaped parts 11.1, 11.2 of the core 11 together. It is to mention that the needed wire windings have to be wound around the coil body 2 before the clamps are mounted around the transformer body 10.

15 To assemble the transformer body 10, the separating plates 3 are pressed over the coil body 2 and then the E-shaped parts 11.1, 11.2 of the core 11 are fitted together by inserting the middle legs 13 into the opening 4.1. E-shaped part 11.1 is inserted from the front (as shown in fig. 2) and E-shaped part 11.2 is inserted into the opening 4.1 from behind. Then the transformer body is clamped together for example by mounting clamps in the recesses 14.

20 In the assembled transformer body 10, both outer separating plates 3 are directly in touch with the E-shaped parts 11.1, 11.2 of the core 11. Hence, the heat generated within the windings of the transformer can be efficiently dissipated via the separating plates 3 to the core 11, which functions as a heat sink.

25 Fig. 4 shows the coil body 2 with four separating plates 3 in a side view. The separating plates 3 are not yet fitted over the coil portion 6 and no wire windings are provided on the surface of the coil portion 6. In this view, the recesses 8 for holding the separating plates 3 and the terminals 9 on the flange parts 7.1, 7.2 can be seen clearly.

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Fig. 5 shows the same coil body 2 as fig. 4 but here, the four separating plates 3 are fitted over the coil portion 6 thereby dividing the surface of the coil portion 6 into three coil areas 15. In each of these coil areas 15, a wire winding 16 is provided on the surface of the coil portion 6.

- 5 When a transformer with a coil body 2 as shown in fig. 5 is in operation, the wire windings 15 generate a lot of heat. This heat is generated just near the separating plates 3 which are made of a metal such as for example copper or aluminium or any other metal with high heat conducting capabilities. This means that the separating plates not only serve as a side support for the wire windings 15 but also dissipate the heat generated within the wire
- 10 windings 15 efficiently. As mentioned above, the separating plates 3, or at least some of them, are in direct contact with the core 11 which helps to dissipate even more heat.

At this point, it is to mention, that fig. 5 shows a small space between the outermost separating plates 3 and the flange portion 7 and the other side of the coil body 2. However, as the separating plates 3 are in direct contact with the flange portion 7 (and with the smaller

15 flange portion on the other side), there are no such spaces. This is also true for other figures, such as for example fig. 8, where there seems to be a small space between the separating plates 3.1 and the insulation plates 19.

Fig. 6 shows an exploded perspective view of another transformer body 10.1 with a further embodiment of a coil form 1.1 according to the invention. The coil body 2.1 is almost the

20 same as the coil body 2 in the transformer body 10 of fig. 2. The only difference is, that it comprises just two recesses 8 on the surface of the coil portion 6.1.

There are four separating plates 3.1 which are arranged in two groups and which have slightly a different shape than the separating plates 3 of fig. 1 and 2. The shape of the separating plates 3.1 is shown in more detail in fig. 7. The separating plates 3.1 have a

25 recess 17 on the lower edge of the opening 4 and on both sides of the slit 5.1 they have a terminal projection 18. At this point it is to say that, although all of the four separating plates 3.1 have the same shape, two of them (that is one in each group as shown in fig. 6) are laterally reversed.



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**Ansprüche 1 – 15**

1. A coil form (1, 1.1) for forming an inductive element with a core (11.1, 11.2) and at least two coils, including
  - a) a hollow coil body (2) for insertion of the core, the coil body having an outer surface
  - 5 b) and at least one separating plate (3, 3.1) which surrounds the outer surface of the coil body thereby providing at least one coil area (15, 15.1) on the surface of the coil body,  
characterised in that
    - c) the coil body is made of plastic and includes at least one recess on its outer surface  
10 for positioning and holding the at least one separating plate,
    - d) the separating plate is made of metal, having an opening (4) for pushing the separating plate over the coil body and having a slit (5) for prohibiting leakage currents within the separating plate,
    - e) the separating plate forms a winding of one of the at least two coils
    - 15 f) and in that another coil of said at least two coils includes an insulated wire wound around the coil body in said at least one coil area, the separating plate being a side support for said wire and dissipating heat generated within the wire.
2. A coil form according to claim 1, characterised in that the coil body includes a coil portion (6) of a kind of a hollow cylinder for slipping over the separating plate and a flange  
20 portion (7) on an end region of the coil portion.
3. A coil form according to claim 2, characterised in that the flange portion includes a plurality of terminals (9) where at least one terminal is electrically conductively connectable to an end of one of the at least two coils.
4. A coil form according to any of claims 1 to 3, characterised in that a shape of the opening (4) of the separating plate substantially corresponds to a shape of the outer surface  
25 of the coil body and in that an internal diameter of the separating plate is smaller than an outer diameter of the coil body.

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Veröffentlichungs-Nr.: WO 2004/032159  
Anmelder: Delta Energy Systems (Switzerland) AG,

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5. A coil form according to any of claims 1 to 4, characterised in that the coil body comprises at least two elements (20.1, 20.2) with means (21, 22) to fit the elements together to form the coil body.
- 5 6. A coil form according to claim 5, characterised in that the coil body comprises a first and a second element (20.1, 20.2) and in that the means to fit the elements together include a recess (21) on the first element and a corresponding projection (22) on the second element.
- ) 7. A coil form according to any of claims 5 to 6, characterised in that the coil portion is of a kind of a right cylinder, where the coil body is separated into two elements by a plane  
10 being perpendicular to a base plane of the right cylindrical coil portion.
8. An inductive element with a coil form according to any of claims 1 to 7, a core (11.1, 11.2) inserted into the hollow coil body and at least one coil, provided on the outer surface of the coil body.
9. An inductive element according to claim 8, characterised in that it includes a plurality of  
15 separating plates (3, 3.1), where preferably an isolation plate (19) is provided between two adjacent separating plates.
- ) 10. An inductive element according to any of claims 8 to 9, characterised in that at least one winding of the at least one coil is formed by the separating plate.
11. An inductive element according to any of claims 8 to 10, characterised in that the core  
20 (11.1, 11.2) of the inductive element has a shape of two rectangular portions with a common edge (13), where the common edge is inserted into the hollow coil body and whereby the core preferably includes two E-shaped parts (11.1, 11.2).
12. A coil form having a hollow coil body for insertion of a core of an inductive element and having an outer surface for holding a coil of the inductive element, characterised in that

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the coil body includes at least two elements (20.1, 20.2) with means (21, 22) to fit the elements together to form the coil body.

13. A coil form according to claim 12, characterised in that the coil body includes a first and a second element (20.1, 20.2) and in that the means to fit the elements together include a recess (21) on the first element and a corresponding projection (22) on the second element.
14. A coil form according to any of claims 12 to 13, characterised in that the coil body includes a flange portion (7) and a coil portion (6) which is of a kind of a right cylinder, where the coil body (2) is separated into two elements (20.1, 20.2) by a plane being perpendicular to a base plane of the right cylindrical coil portion.
15. A coil form according to any of claims 12 to 14, characterised in that it includes an additional hollow outer coil body for insertion of the coil body and for pushing over the separating plate.